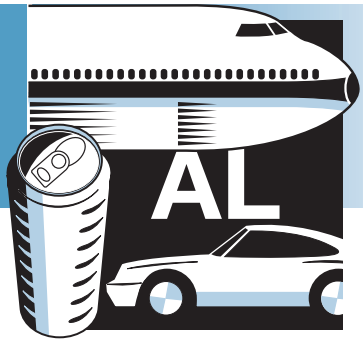
ALUMINUM
Project Fact Sheet

A Motor Challenge Success Story



IMPROVED SYSTEM YIELDS $100,000 ANNUAL SAVINGS

BENEFITS

- Reduced annual energy consumption by 12%
- $103,736 cost savings per year
- No capital cost; immediate payback
- Reduced maintenance
- Resulted in spare fans
- Reduced noise levels
- Increased fan control accuracy

"The smarter we run our plant, the better it is for the company's bottom line, local community, and the environment as a whole."

—Cecil Pulley
Showcase Demonstration
Team Leader, Alcoa

Alcoa (formerly Alumax), the third largest aluminum producer in the United States, takes pride in its efforts to increase energy efficiency and minimize pollution at its plants. Alcoa's Mount Holly plant in South Carolina wanted to improve the energy efficiency of its four pot line dust collection systems.

Each system, which collects dust and other airborne impurities generated during the alumina to aluminum reduction process, includes four fans that deliver the air to a stack for emission. These continuously-operating fans were designed to provide each system with a total airflow of 360,000 cfm. But, staff at Alcoa found it could operate the systems at lower flows and heads—without affecting performance.

Solution

In 1996, the U.S. Department of Energy's Motor Challenge Program selected the Mount Holly Facility as a Showcase Demonstration project to find the optimum way to run the dust collection systems at reduced rates and discover which operating method would best match fan capacity to system demand. A Showcase Demonstration Team of Alcoa and Jacobs-Sirrine Engineers used a systems approach: they conducted a field test and measured fan

SYSTEMS ANALYSIS AT ALCOA YIELDS SIGNIFICANT SAVINGS

Alcoa's Mount Holly Aluminum Production Facility.

speed, air temperature, air flow, static pressure, and fan motor power consumption. These measurements were then used to compare four different operating scenarios, including the use of variable-frequency drives.

Simply turning off one fan was the best solution. A three-fan variable inlet vane (VIV) system proved to be the most efficient and cost-effective scenario because the VIVs were open wider and resulted in less pressure loss. Although air flow must be split between the ductwork to three fans—rather than four—the three-fan system had higher velocities in the ducts and a marginally higher pressure drop. And even though the power consumption of each fan was higher in the three-fan scenario, the total power consumption of this system was less than in the four-fan VIV mode because only three fans were operating.

Turning off one of the four fans and changing the VIV controller "set points" to maintain the required airflow were the only activities needed to transition from the four-fan VIV system.

"Motor Challenge saved us a lot of money by helping us explore other ways to improve our processes. By staying with what we had and simply changing the way we operate, we avoided spending $850,000 to purchase variable-speed drives to improve our efficiency. By simply switching off one fan, we are saving $15,000 more than we would have with the variable-frequency drives," adds Cecil.

Results

The resulting demand reduction of 382 kW translated into annual energy savings of about 3,350,000 kWh, nearly 12% less than the original system. Alcoa realized $103,736 gross and net annual savings since there were no capital costs and the payback was immediate.

Summary of Implementation Benefits

Energy consumption	12% reduction
Cost savings	$103,736/year
Capital cost	None
Payback	Immediate

Industry of the Future—Aluminum

Through OIT's Industries of the Future initiative, the Aluminum Association, Inc., on behalf of the aluminum industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, ***Aluminum Industry: Industry/Government Partnerships for the Future****. The Aluminum Industry Technology Roadmap presents a blueprint of milestones necessary to achieve the goals set in the industry's vision.*

OIT Aluminum Team Leader: Sara Dillich (202) 586-7925.

MOTOR CHALLENGE

Motor Challenge, administered by the Office of Industrial Technologies, is a voluntary partnership program with U.S. industry to promote the use of energy-efficient electric motor systems. Thousands of industrial partners have joined Motor Challenge and are improving their, and in turn, the Nation's, competitiveness and efficiency.

Motor Challenge assists the aluminum industry and other OIT Industries of the Future by identifying near-term gains in energy efficiency these industries can achieve by adopting existing technologies.

Project Partners

Alcoa
Mount Holly, SC

Jacobs-Sirrine Engineers
Greenville, SC

For Additional Information, Please Contact:

The Information Clearinghouse
Phone: (800) 862-2086
Fax: (360) 586-8303
http://www.motor.doe.gov

Visit our home page at
www.oit.doe.gov

Please send any comments, questions, or suggestions to
webmaster.oit@ee.doe.gov

Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

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DOE/GO-10099-545
January 1999